Reconsidering the Argument from Underconsideration[1]

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Abstract

According to the argument from underconsideration, since theory evaluation is comparative, and since scientists do not have good reasons to believe that they are epistemically privileged, it is unlikely that our best theories are true. In this paper, I examine two formulations of this argument, one based on van Fraassen's "bad lot" premise and another based on what Lipton called the "no-privilege" premise. I consider several moves that scientific realists might make in response to these arguments. I then offer a revised argument that is a middle ground between realism and anti-realism, or so I argue.

Keywords

anti-realism, argument from underconsideration, bad lot, epistemic privilege, scientific realism

1. Introduction

The argument from underconsideration is advanced by anti-realists as an argument against scientific realism. According to this argument, it is unlikely that our best scientific theories are true, since theory evaluation is comparative, and since scientists have no good reasons to believe they are selecting from a set of theories that contains a true theory. As Lipton (1993, 89) points out, this argument has two premises. The first is the *ranking premise*, which states that theory testing yields comparative warrant. As Lipton (1993, 89) puts it: "testing enables scientists to say which of the competing theories they have generated is likeliest to be correct, but does not itself reveal how likely the likeliest theory is."

The second is the *no-privilege premise*, which states that "scientists have no reason to suppose that the process by which they generate theories for testing makes it likely that a true theory will be among those generated" (Lipton 1993, 89). From these two premises, anti-realists conclude that, "while the best of the generated theories may be true, scientists can never have good reason to believe this" (Lipton 1993, 89). In other words, although they might have good reasons to believe that they have selected the theory that is likeliest to be true from a set of competing theories, scientists have no good reason to believe that any of the competing theories is likely true. The argument from underconsideration is thus aimed against the epistemic thesis of scientific realisms, which is the claim that "Mature and predictively successful scientific theories are well-confirmed and approximately true of the world. So, the entities posited by them, or, at any rate, entities very similar to those posited, inhabit the world" (Psillos 1999, xix).

In what follows, I examine two formulations of this argument, one based on van Fraassen's "bad lot" premise and another based on the "no-privilege" premise. I consider several

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moves that scientific realists might make in response to these arguments. I then offer a revised argument that is a middle ground between realism and anti-realism, or so I argue.

2. The Bad Lot Premise

According to van Fraassen (1989, 149), scientists may be choosing the best theory of a bad lot. Following Wray's (2010) recent discussion of the argument, van Fraassen's "bad lot" version of the argument can be stated as follows:

(F1) In evaluating theories scientists merely rank the competitors comparatively. [The Ranking Premise]

(F2) There is no reason to suppose that a true theory will be among the theories evaluated. [The Bad Lot Premise]

(F3) Therefore, there is no reason to believe that the theory that is judged to be superior is likely true.

Accordingly, anti-realists claim that there is no reason to suppose that the set of theories to be evaluated contains a true theory. In reply, realists might wonder: why do we need to suppose that? Isn't that what theory testing is all about? Realists might argue that we don't need a reason to think that the set of competing theories contains a true theory before we begin testing. For realists, the testing itself will separate the good theories, if there are any, from the bad ones. If all the theories in the set fail their tests, then it is a bad lot. But if at least one theory passes its tests, then it is not a bad lot after all.

To see why (F2) might seem odd to scientific realists, consider the following analogous argument:

(T1) In evaluating contestants on talent shows, judges merely rank the contestants comparatively.[2]

(T2) There is no reason to suppose that a talented person will be among the contestants evaluated.

(T3) Therefore, there is no reason to believe that the person that is judged to be the winner is likely talented.

Premise (T2) seems rather odd. We do not need to suppose that a talented person is among the contestants. That is what the competition is all about. The competition is supposed to separate the talented from the untalented and weed out the untalented. Like in the case of theory testing, the criterion of selection has to do with success. That is to say, the judges assume that performing excellently on a consistent basis, under the strict conditions of a competition, is a reliable indicator of talent. Again, like in the case of theory testing, if all the contestants fail to perform excellently on a consistent basis throughout the competition, then the lot of contestants is probably a bad one. In any case, it is the competition that will separate the talented from the

[2] I have in mind reality shows in which contestants compete, such as *American Idol* and *Britain Got Talent*.

untalented. Similarly, realists would argue, it is experimental and observational testing that will separate the (approximately) true theories from the false ones.

3. The No-Privilege Premise

More recently, Wray (2010) has proposed a revised version of van Fraassen's "bad lot" argument, which was labeled the argument from underconsideration by Lipton (1993). According to Wray (2010, 3), anti-realists argue as follows:

(W1) In evaluating theories scientists merely rank the competitors comparatively. [The Ranking Premise]

(W2) Scientists are not epistemically privileged, that is, they are not especially prone to develop theories that are true with respect to what they say about unobservable entities and processes. [The No-Privilege Premise]

(W3) Hence, we have little reason to believe that the theory that is judged to be superior is likely true.

In response, realists might complain that the no-privilege premise, i.e., (W2), which talks about "epistemic privilege" and scientists being "especially prone," makes it sound as if scientists have a special gift of some sort. But, realists would argue, that is a rather strange way of talking about science. Coming up with good explanations for natural phenomena is a complex human endeavor that involves many factors, having to do with talent, skills, diligence, training, and so on. In addition to the human aspect of theory generation, there is also a methodological aspect involving observation instruments, experimentation techniques, patterns of inference, etc. The no-privilege premise—(W2)—seems to assume that these aspects of theory generation do not change and that scientists never get better at what they do.

To see why (W2) might seem odd to scientific realists, consider the following analogous argument:

(B1) In evaluating desserts, chefs merely rank the competitors comparatively.

(B2) Chefs are not "culinarily privileged," i.e., they are not especially prone to make desserts that are delicious.

(B3) Therefore, we have little reason to believe that the dessert that is judged to be superior is likely delicious.

Premise (B2) seems rather odd. To say that chefs are "culinarily privileged" seems like a strange way of talking about the culinary arts. Chefs get better at making desserts through training and practice. Similarly, realists might argue, scientists get better at developing theories through training and practice. For realists, there is nothing mysterious about "epistemic privilege" going on here. So realists would find (W2) odd for the same reasons that (B2) seems odd.

In reply, anti-realists could appeal to the pessimistic induction. Wray (2010, 6) writes that the "no-privilege thesis […] asks us to acknowledge the similarities between contemporary scientists and their predecessors." He quotes Mary Hesse who argues that the support for the no-

privilege premise comes from an "induction from the history of science." Wray also points out in a footnote that "this is a pessimistic induction of the sort that Laudan (1984) develops." For realists, however, the problem with the pessimistic induction is that it overemphasizes the similarities and underemphasizes the dissimilarities between contemporary theories and their predecessors. Similarly, realists might argue, the problem with Wray's formulation of the argument from underconsideration is that it overemphasizes the similarities and underemphasizes the dissimilarities between contemporary scientists and their predecessors. As Bird (2007, 80) puts it:

> The falsity of earlier theories is the very reason for developing the new ones—with a view to avoiding that falsity. It would be folly to argue that because no man has run 100 m in under 9.5 seconds no man ever will. On the contrary, improvements in times spur on other competitors, encourage improvements in training techniques and so forth, that make a sub 9.5 second 100 m quite a high probability in the near future. The analogy is imperfect, but sufficiently close to cast doubt on Laudan's pessimistic inference. Later scientific theories are not invented independently of the successes and failures of their predecessors. New theories avoid the pitfalls of their falsified predecessors and seek to incorporate their successes.

Likewise, Lipton (2000, 197) argues that we cannot infer "future theories are likely to be false" from "past theories turned out to be false" by induction because of the "Darwinian" evolution of theories. A similar point, realists might argue, applies to scientists as well. Contemporary scientists learn from their predecessors and they seek to avoid their predecessors' mistakes. Furthermore, contemporary scientists have access to instruments and technologies that were not available to their predecessors. For realists, these aspects of scientific change make a difference insofar as the ability of scientists to select theories that are (approximately) true is concerned.

4. Truth vs. Approximate Truth

To this anti-realists might object that the analogous arguments sketched above fail to show that (W2) and (T2) should be rejected, for deliciousness and being talented, which are supposed to be traits analogous to truth, are not analogues to truth at all. Deliciousness and being talented are relative qualities. For example, in the case of deliciousness, whatever cakes we have in a particular lot, we can always imagine being led to consider one of the cakes as delicious, especially if we never tasted a better cake before. But truth is not a relative quality, the objection continues. Propositions are categorically true or false.

In reply, realists might concede that propositions are categorically true or false. However, they might insist that, strictly speaking, only singular propositions can be true or false (Kvanvig 2003, 191), and since theories (whatever they are) are not singular propositions, they cannot be said to be true or false. Accordingly, a theory, expressed as a set of propositions, can have true and/or false propositions as its parts. However, realists might protest, it seems that anti-realists assume that even one false proposition taints a whole theory. For instance, Kitcher points out that the pessimistic induction assumes this kind of implicit holism about theories. As Kitcher (2002, 388) writes:

> We are invited to think of whole theories as the proper objects of knowledge, and thus, because the theory, taken as a whole, turns out to be false, we have the basis for a "pessimistic induction." *It doesn't follow from the fact that a past theory isn't completely true that every part of that theory is false* (emphasis added).

Since only singular propositions can be true or false, and since theories are not singular propositions, it follows that, strictly speaking, whole theories cannot be true or false (Cf. Kitcher 1993, 118).

By way of illustration, consider the following example, which is adapted from Leplin (1997, 133). Suppose that there is a power outage in my house. Upon looking outside my window, I see a utility truck parked nearby and some workers digging in the yard. Since I made a call to the phone company earlier about a problem with my phone line, I infer that telephone repairmen, who have responded to my earlier call, inadvertently cut the power line to my house. Unbeknownst to me, however, it is not telephone repairmen who have cut the power line but cable repairmen whom I had not expected. Now, if we take this "theory," i.e., that there is a power outage in my house because telephone repairmen have inadvertently cut the power line to my house, as a monolithic whole, then it is strictly false. However, this theory involves several claims, some are true and some are false. On the one hand, it is not the case that telephone repairmen working in the backyard have inadvertently cut the power line. On the other hand, it is true that repairmen working in the backyard have inadvertently cut the power line. I may not know the truth, the whole truth, and nothing but the truth about this state of affairs. But I do know some parts about it, and those parts are themselves true.

Consider another example from the history of science. In his *An Inquiry into the Causes and Effects of the Variolae Vaccinae* (1798), Edward Jenner argues that cowpox originated as grease, a disease common in horses. He claims that it was transmitted to cows when horse handlers helped with milking on occasion. In addition, Jenner (1800, 7) claims not only that cowpox protected against smallpox but also that "what renders the Cow Pox virus so extremely singular, is, that the person who has been thus affected is for ever after secure from the infection of the Small Pox."

Now, if we take the entire *Inquiry* as Jenner's "theory," then it is strictly false as a whole. He was wrong about grease being the origin of cowpox. He mistakenly took horsepox for grease, and there was no intermediate passage through cows either. Even though he got some things wrong, he was right about others. His hypothesis, properly construed, is correct. While it is not the case that vaccination provides lifelong protection, as Jenner thought, it is the case that repeated vaccination, properly done, contributes to the control of smallpox. Indeed, Jenner paved the way for this knowledge, and the know-how for selection of correct material for vaccination, with his distinction between true and spurious cowpox. Nowadays, pseudocowpox (milker's nodes) is recognized as a type of spurious cowpox (Baxby 1999). According to the World Health Organization, "Publication of the Inquiry and the subsequent promulgation by Jenner of the idea of vaccination with a virus other than variola virus constituted a watershed in the control of smallpox, for which he more than anyone else deserves the credit" (Fenner, et al. 1988, 264).

Another example is Paul Ehrlich's side-chain theory of antibody formation. Ehrlich proposed that harmful compounds can mimic nutrients for which cells express specific receptors.

However, he considered these receptors to be on all cell types. He also did not realize that there are specialized producer cells, such as B lymphocytes. He thought of the entire spectrum of receptors as a single cell because he considered their main task as the uptake of different nutrients. These are parts of Ehrlich's side-chain theory that turned out to be incorrect. It does not follow, however, that the entire theory is wrong. Despite these errors, the theory is based on a correct principle, which is that "specific receptors on cells interact with foreign material in a highly specific way, and this triggers their increased production and release from the cell surface so that they can inactivate foreign material as antibodies" (Kaufmann 2008, 707).

If this is correct, then it seems that we should abandon talk of whole theories as being true or false. Instead, we should talk about theoretical claims as being true or false. Indeed, Wray seems to acknowledge this point. Wray (2008, 323) writes:

> For the sake of clarity, let me call H_1 the Tychonic hypothesis, rather than the Tychonic theory. After all, *the Tychonic theory includes an array of other claims* (emphasis added).

And, more recently, Wray (2010, 6) writes:

> But our theories, consisting of many *theoretical claims*, that is, a conjunction of numerous theoretical claims, are most likely false (original emphasis).

If this is correct, then we can distinguish between truth and approximate truth. Articulating a precise notion of approximate truth is beyond the scope of this paper. Nonetheless, on most accounts of approximate truth, this notion is cashed out in terms of a theory being close to the truth. Hence, to say that *T* is approximately true is to say that *T* is close to the truth.[3] How do we know that *T* is close to the truth? Well, realists would argue, we test it. But anti-realists would insist that theory evaluation is comparative. So when we test theories, we compare them. From a set of competing theories, if one theory *T* passes the tests, then that is a reason to believe that *T* is closer to that truth than its competitors. If this is correct, then approximate truth, which is a property of theories, is not like truth, which is a property of propositions, insofar as the former is relative, whereas the latter is categorical.

To sum up, then, truth is a property of propositions, since only propositions can be categorically true, whereas approximate truth is a relation between theories, since a theory can be closer to the truth only relative to its competitors. Some might object, however, that theories, expressed as sets of propositions, are simply conjunctions, and conjunctions are categorically truth or false. In reply, I would argue that the truth/approximate truth distinction is analogous to the logical distinction between truth and validity. In logic courses, we teach our students that deductive arguments can be valid or invalid, but not true or false. Even though, in principle, a deductive argument can be expressed as a conditional (i.e., if the premises are true, then the conclusion must be true), which is categorically true or false. In logic, we reserve the terms 'true' and 'false' to premises and conclusions, and the terms 'valid' and 'invalid' to arguments to capture the difference between truth as a property of propositions and validity as a relation between propositions (more specifically, a relation between premises and a conclusion). Similarly, I submit, we should reserve the term 'true' to theoretical claims, which are singular

[3] See, e.g., Leplin (1981), Boyd (1990), Weston (1992), Smith (1998), and Chakravartty (2010).

propositions that can be categorically true or false, and the term 'approximately true' to theories, which is a relation between theories, even though, in principle, theories can be expressed as conjunctions.

5. A Middle-Ground Argument

In Section 3, I have said that realists might find the no-privilege premise—(W2)—in Wray's version of the argument from underconsideration rather odd, since it seems to assume that scientists never get better at theory generation. However, anti-realists might object to that and argue that scientists do get better at theory generation, but they never become good enough such that it is reasonable to believe that their theories are likely true. It seems to me that anti-realists would be correct in arguing that there may not be good reasons to believe that scientists become good enough such that it is reasonable to believe that their theories are likely true. For one thing, the logical space of possible theories is so vast that it seems rather unlikely that scientists would stumble on those competing theories that are closest to the truth. However, I think that anti-realists are wrong in concluding from this that there are no good reasons to believe that certain theories are closer to the truth than others. In this section, then, I will try to carve out a middle ground between realism and anti-realism.

If the aforementioned considerations are correct, then I think it is safe to say that the following claims are true:

(1) Theoretical claims, expressed as singular propositions, can be categorically true or false.

(2) Theories, expressed as sets of propositions, have theoretical claims as their parts.

(3) Scientific theories can be said to be approximately true (i.e., T_1 is closer to the truth than T_2).

(4) Theory evaluation is comparative (i.e., to say that T is approximately true is to say that T is closer to the truth than its competitors).

If these claims are indeed true, as I have argued above, then I think that the following argument can be made, which is a middle ground between scientific realism and anti-realism:

(R1) In evaluating theories, scientists rank the competitors comparatively. [The Ranking Premise].

(R2) If scientists rank competing theories comparatively, then they can only make comparative judgments about competing theories, not absolute judgments (i.e., T_1 is likely true).

(R3) Hence, scientists can only make comparative judgments about competing theories, not absolute judgments (i.e., T_1 is likely true).

(R4) If 'approximate truth' (closeness to the truth) is a relation between theories, then to make comparative judgments about competing theories is to say that a theory is

closer to the truth than its competitors (i.e., T_1 is closer to the truth than T_2, T_3,…, T_n).

(R5) 'Approximate truth' (closeness to the truth) is a relation between theories, not a property of theoretical claims.

(R6) Hence, to make comparative judgments about competing theories is to say that a theory is closer to the truth than its competitors (i.e., T_1 is closer to the truth than T_2, T_3,…, T_n).

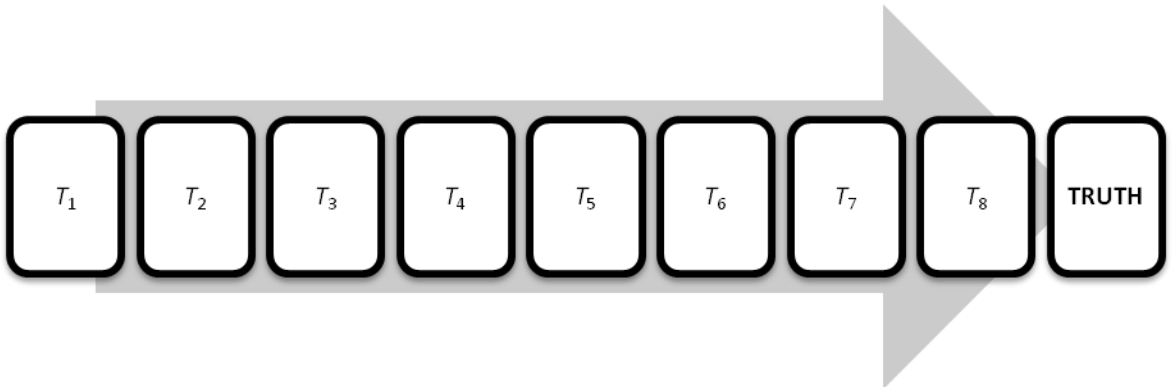
(R7) If the logical space of possible theories is vast, then there are no good reasons to believe that scientists have stumbled upon competing theories that are closest to the truth.

(R8) The logical space of possible theories is vast.

(R9) Therefore, there are no good reasons to believe that scientists have stumbled upon competing theories that are *closest* to the truth.

The upshot of this argument is that theory evaluation can give us reasons to believe that a theory is approximately true (i.e., that T_1 is *closer* to the truth than T_2, T_3,…, T_n) but it cannot give us reasons to believe that a theory is *closest* to the truth (i.e., that T_1 is likely true). For example, if scientists evaluate T_2 and T_3 by observational and experimental testing, they could reasonably make the comparative judgment that T_3 is closer to the truth than T_2 (Figure 1). However, a theory can be closer to the truth relative to its competitors but still be quite far off from the truth. Theory evaluation cannot tell us which theory is *closest* to the truth, unless we have reasons to believe that the theories we are testing are those that are *closest* to the truth (i.e., T_7 and T_8 in Figure 1). But, since we do not have reasons to believe that, as anti-realists argue, we cannot reasonably claim that the theories we have tested are *closest* to the truth (i.e., likely true), although we can reasonably claim that one of them is *closer* to the truth than its competitors. In other words, theory evaluation can tell us which theory among competing theories is *closer* to the truth (e.g., that T_3 is closer to the truth than T_2). However, theory evaluation cannot tell us which theory among competing theories is *closest* to the truth (Figure 1).

Figure 1. T_3 is closer to the truth than T_2 but still quite far off from the truth.



6. Conclusion

In this paper, I examined two formulations of the argument from underconsideration, one based on van Fraassen's "bad lot" premise and another based on what Lipton called the "no-privilege" premise. I considered several moves that scientific realists might make in response to these arguments. I offered a revised argument that I take to be a middle ground between realism and anti-realism, since it adopts the realist thesis that theory evaluation can tell us which theory among competing theories is *closer* to the truth, and the anti-realist thesis that the lot of competing theories could consist of theories that are far off from the truth, and so theory evaluation cannot tell us which theory is *closest* to the truth.

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